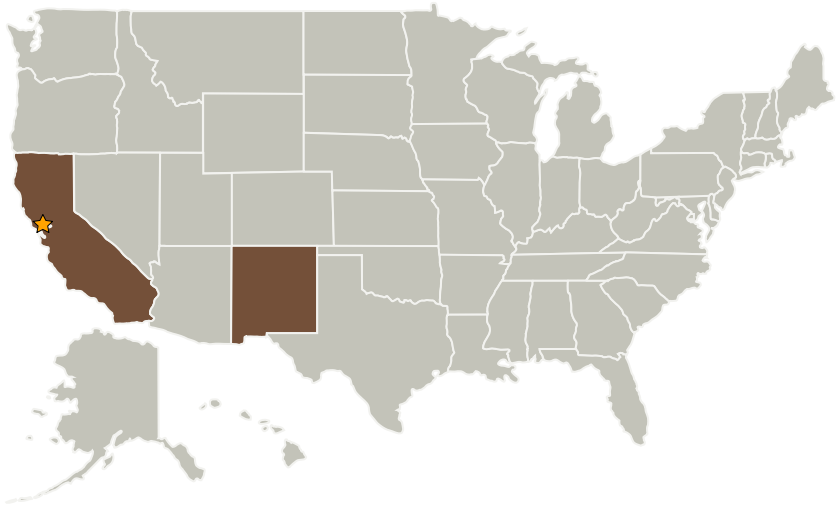
Optical Method for Real-Time Turbine Blade Tip Clearance Measurement, Phase I

Completed Technology Project (2008 - 2008)

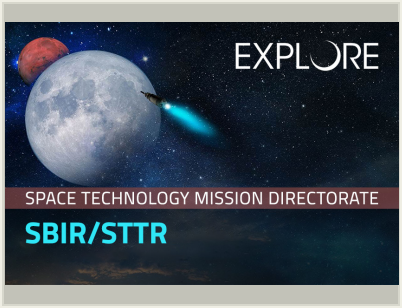
Project Introduction

Monitoring and controlling blade tip clearance of high pressure turbines are important for maintaining the integrity of the engine during its operating points and life cycle. Operating the engine with minimum tip clearance provides several benefits, such as increased turbine efficiency, reduced emissions, and extended service life. Southwest Sciences proposes an innovative technology based on optical Fourier domain reflectometry for near real-time tip-clearance measurement with an accuracy of 10 micrometers or better. A simple and robust optical sensor will withstand temperatures of up to 2000 F; therefore, the method can be applied for tip-clearance measurements in turbine hot sections. The system will allow controlling multiple sensors acquiring data from different locations in the turbine with a single main unit. The Phase I effort will provide experimental evidence of the feasibility of this approach and outline the design of the Phase II prototype instrument.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Southwest Sciences, Inc.	Supporting Organization	Industry	Santa Fe, New Mexico



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations	
California	New Mexico

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Andrei Vakhtin

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.3 Aero Propulsion
    - TX01.3.2 Turbine Based Combined Cycle